



FIG. 1A

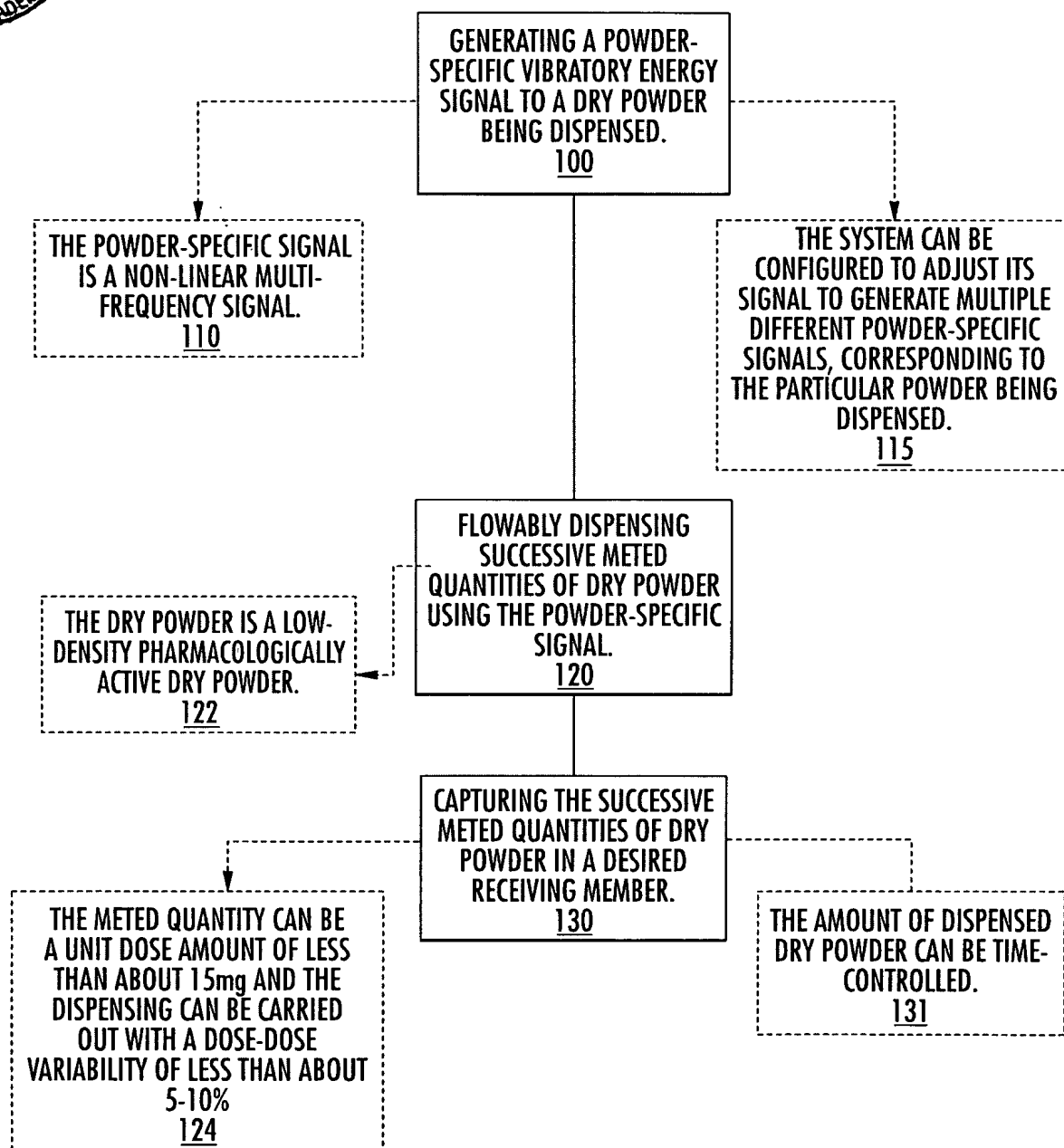


FIG. 1B

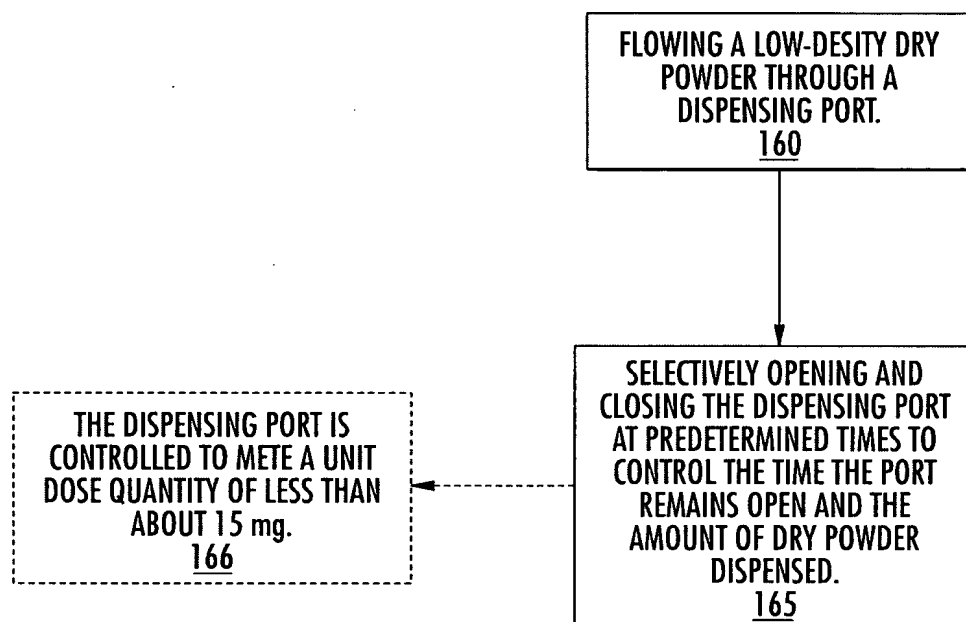
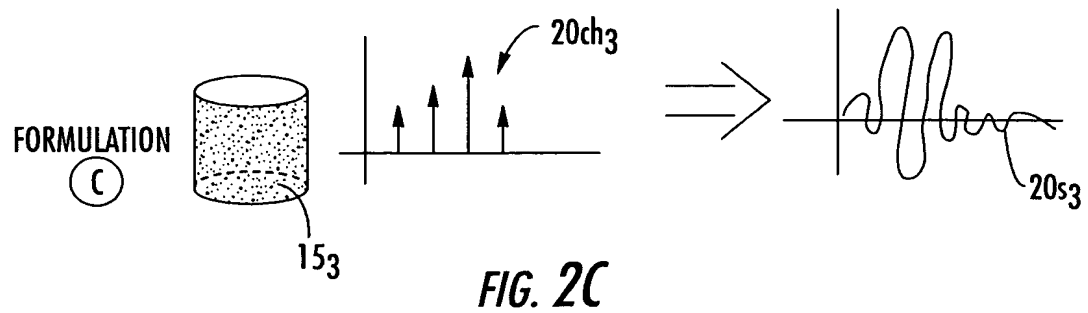
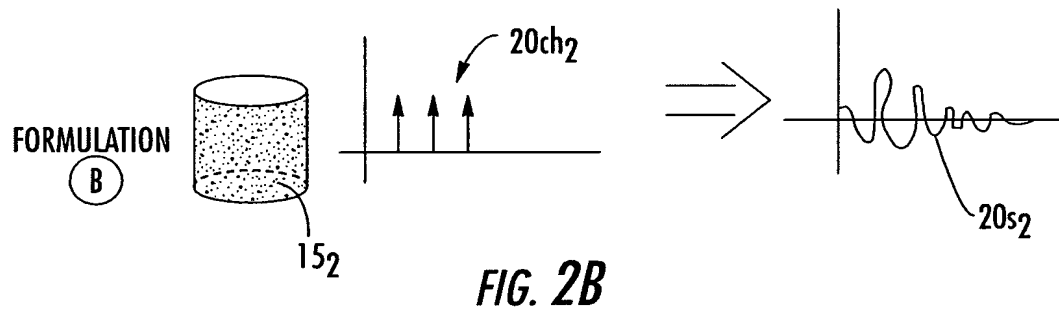
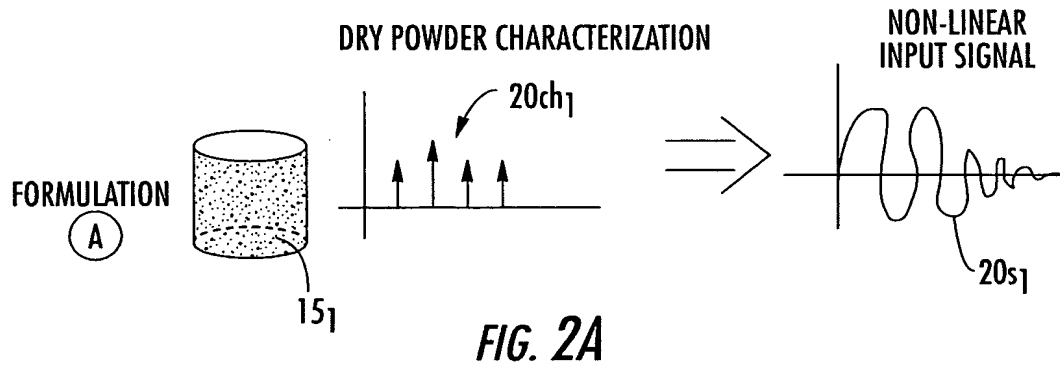


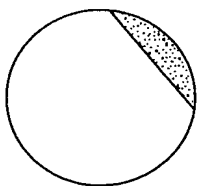
FIG. 1C





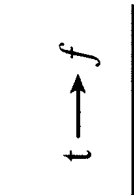
SIGNAL GENERATION ALGORITHM

FIG. 3A



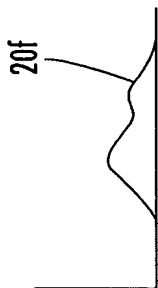
MEASURE TIME BETWEEN
AVALANCHES FOR
POWDERS IN
ROTATING DRUM

FIG. 3B

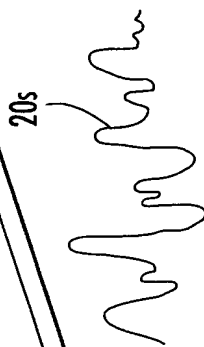


CONVERT TIME
TO FREQUENCY SPACE

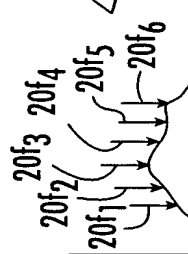
FIG. 3C



PLOT DISTRIBUTION
OF FREQUENCIES



SUPERIMPOSE THESE SIX
FREQUENCIES TO CONSTRUCT
A SINGLE SUPERPOSITION
SIGNAL (CAN INCLUDE
STEP OF ADJUSTING RELATIVE
AMPLITUDES)



RECORD TOP SIX MOST
OBSERVED FREQUENCIES,
TYPICALLY REPRESENTING
75% OF DISTRIBUTION

FIG. 3D

FIG. 3E

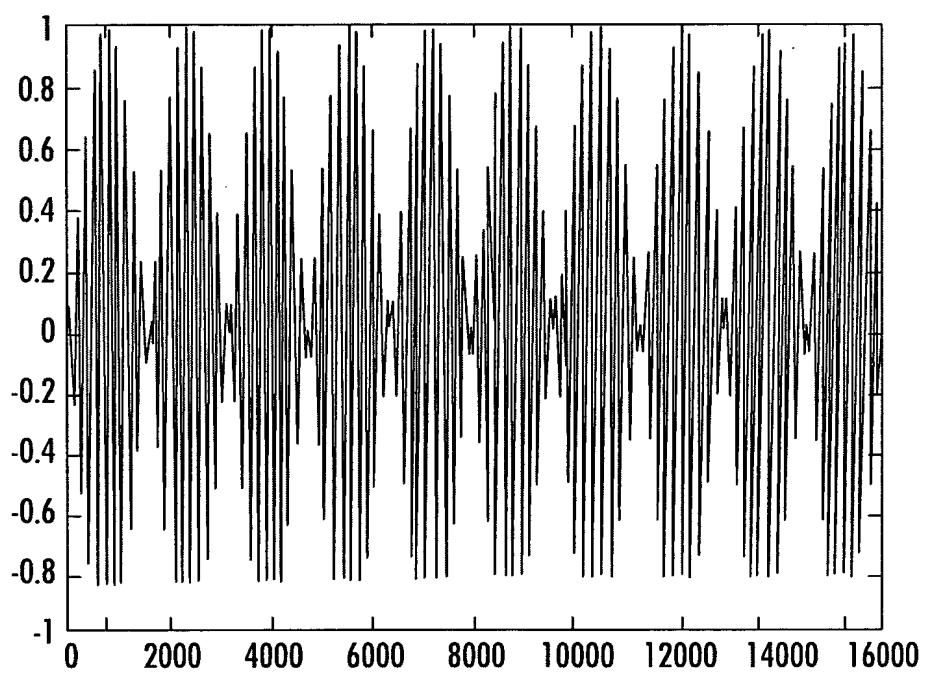


FIG. 4

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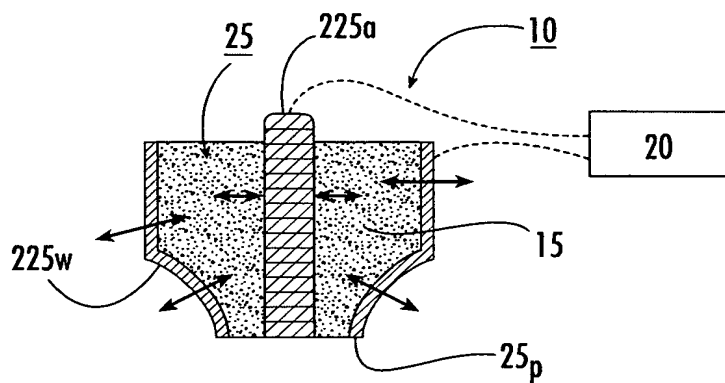


FIG. 5A

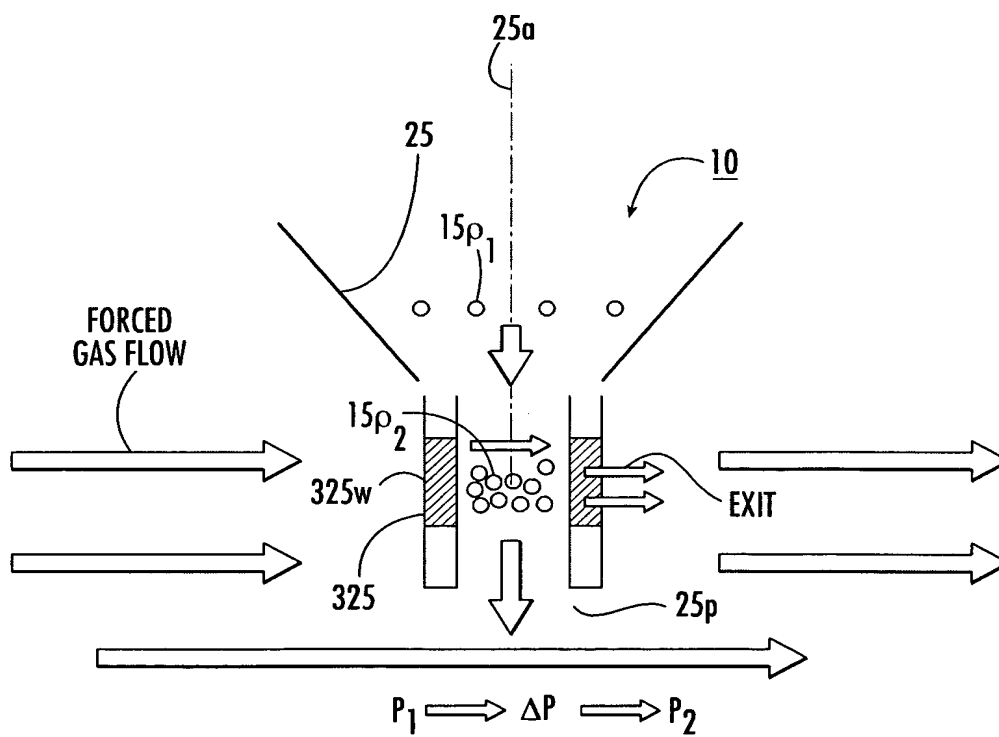


FIG. 5B

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NON-LINEAR VIBRATION / CENTRIFUGATION PRINCIPLE OF POWDER FILLING

BASIC PRINCIPLE:

COMBINE NON-LINEAR FUNCTION
WITH CENTRIFUGAL MOTION

THIS CAN BE ADAPTED
TO LOCAL NON-LINEAR
VIBRATION.

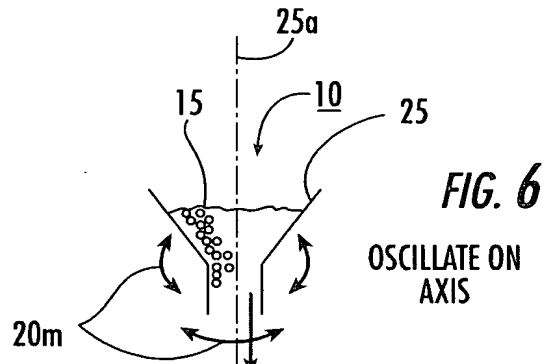


FIG. 6

OSCILLATE ON
AXIS

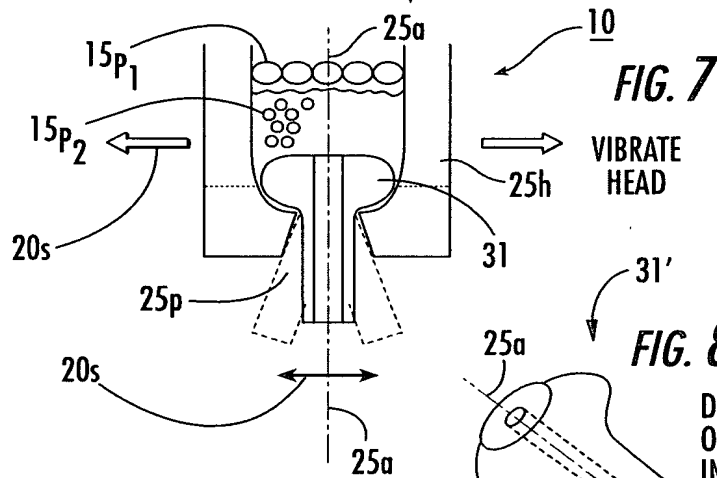


FIG. 7

VIBRATE
HEAD

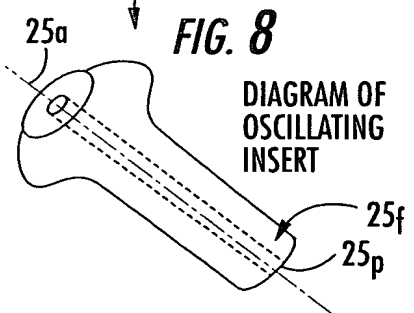


FIG. 8

DIAGRAM OF
OSCILLATING
INSERT

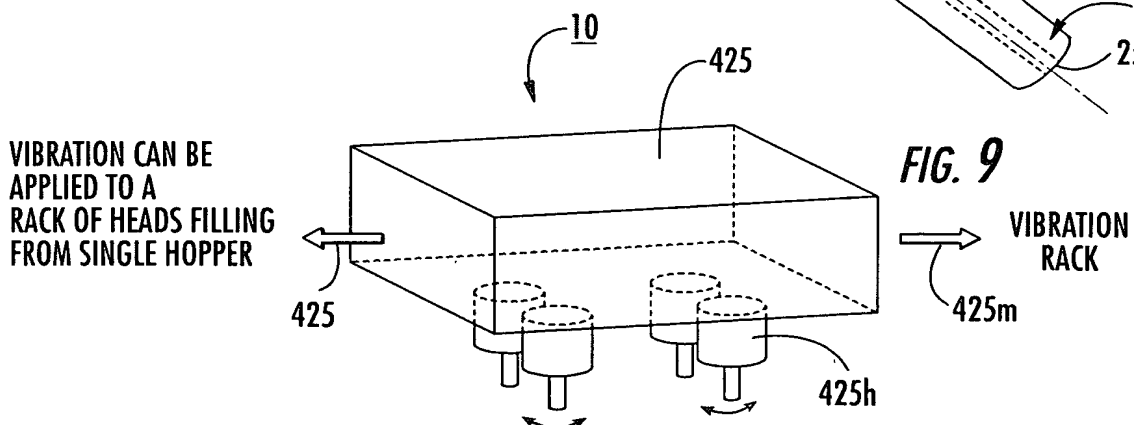


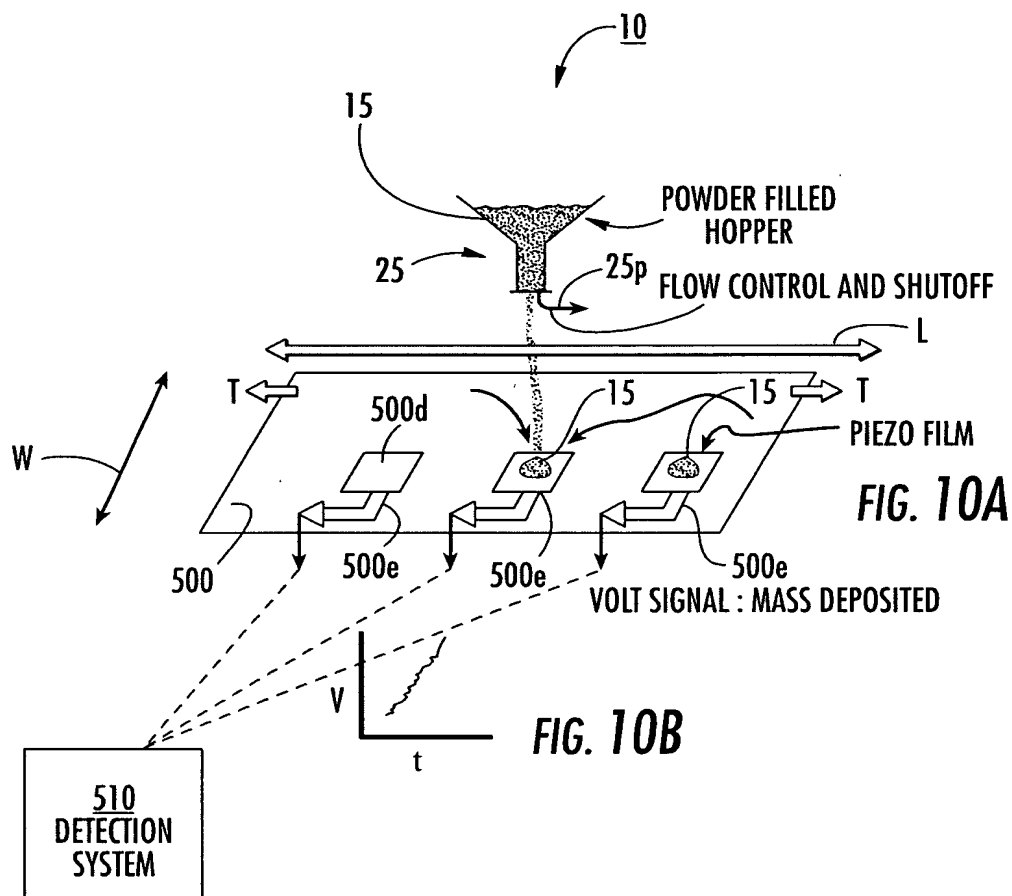
FIG. 9

VIBRATION
RACK

VIBRATION CAN BE
APPLIED TO A
RACK OF HEADS FILLING
FROM SINGLE HOPPER

RADIUS (OR EXTREMES) OF MOTION CAN BE VERY SMALL. AT HIGH FREQUENCY
THE ANGULAR VELOCITY WILL BE SUFFICIENT TO GIVE DIRECTIONAL
ACCELERATION TO PARTICLES.

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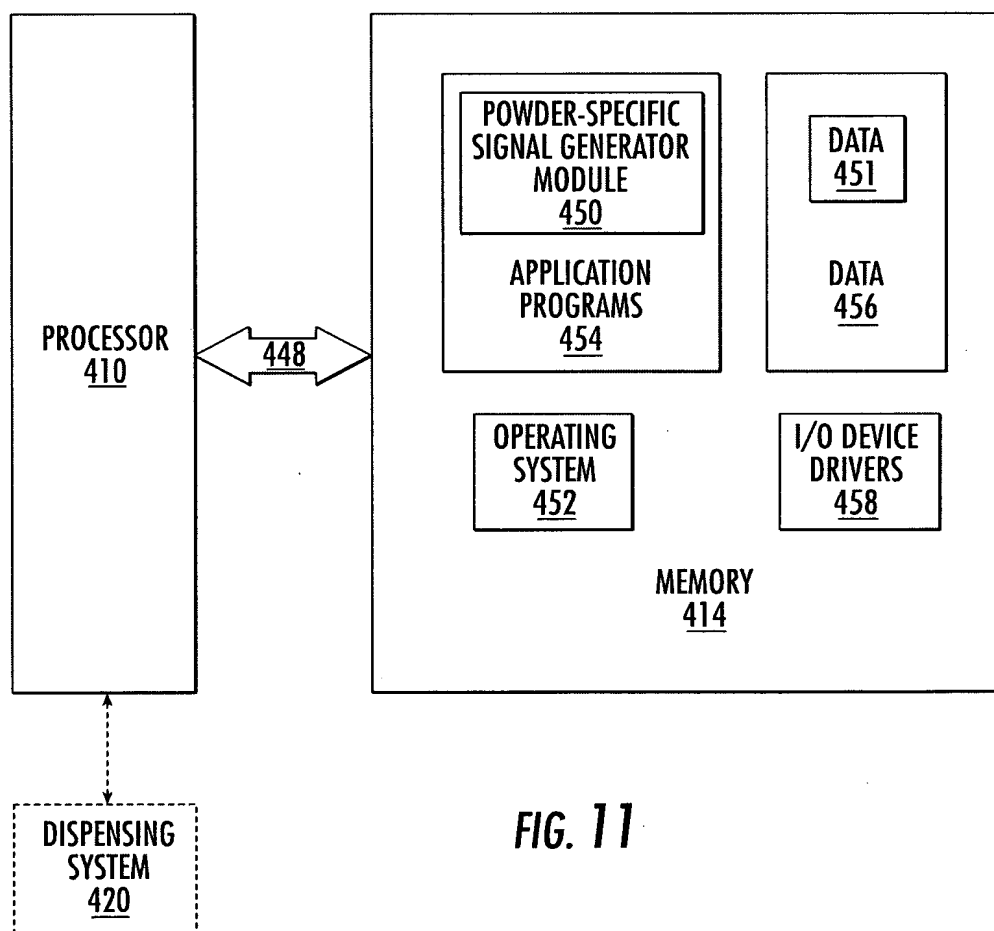


FIG. 11

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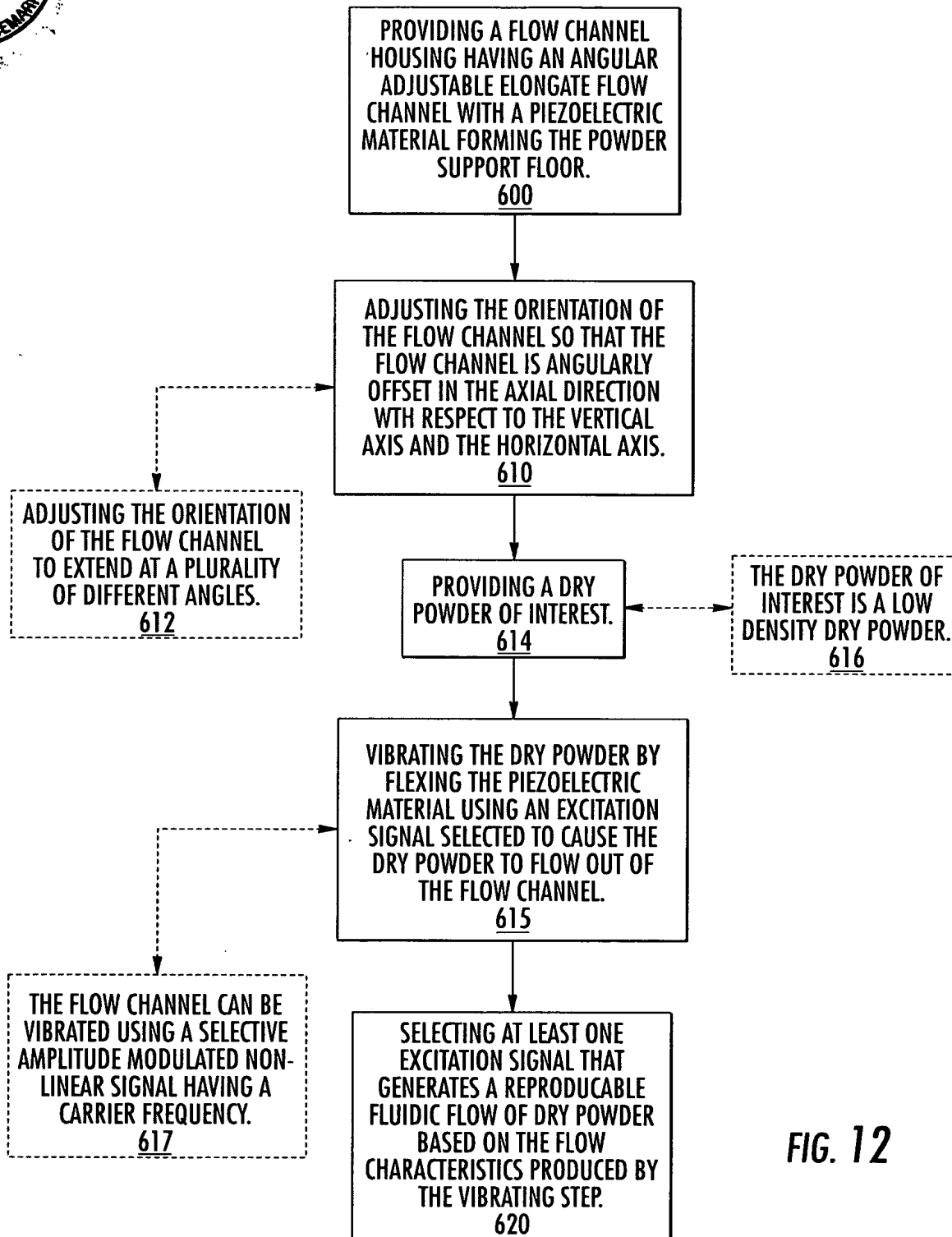
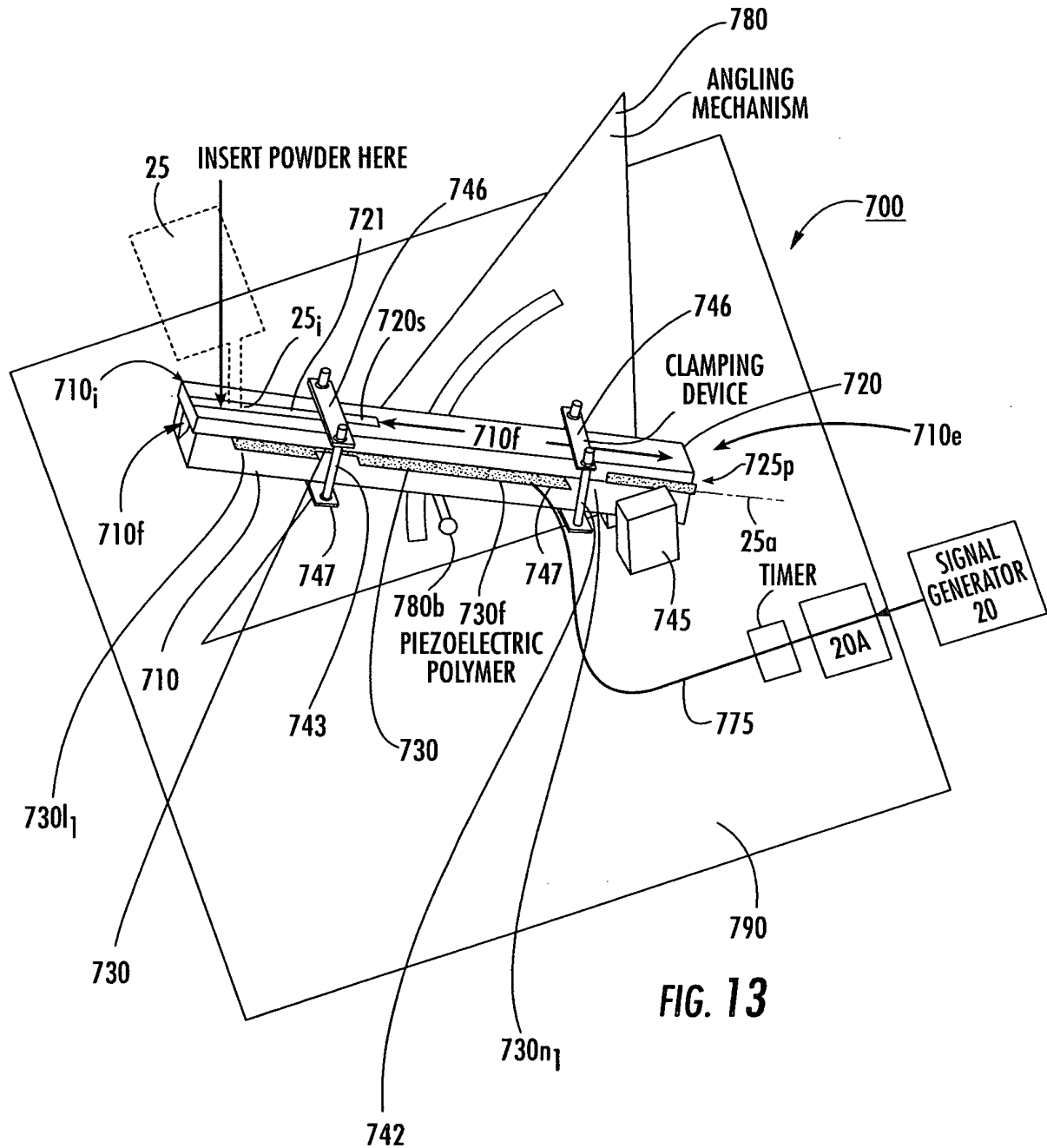


FIG. 12



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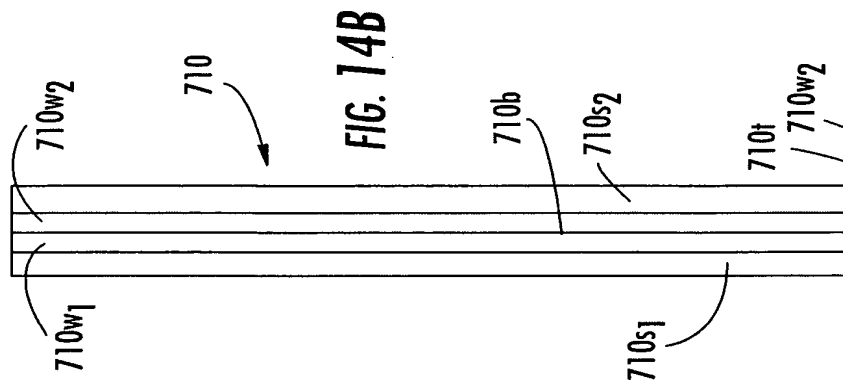
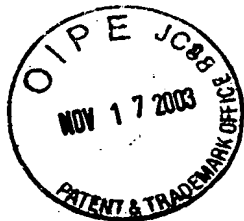


FIG. 14B

CHANNEL

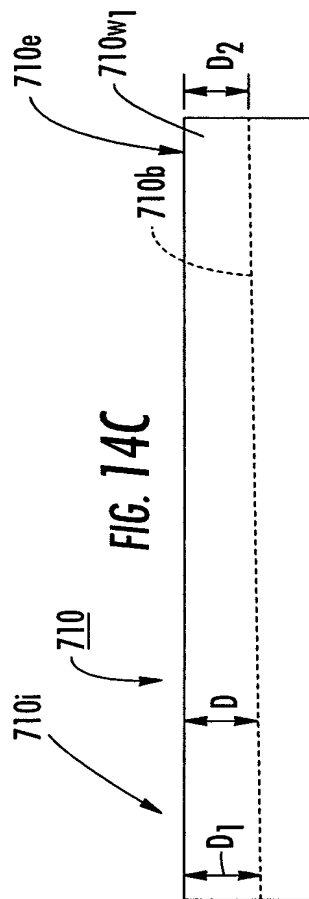


FIG. 14C

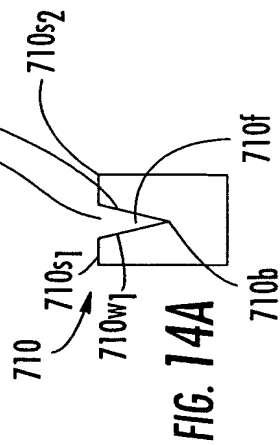
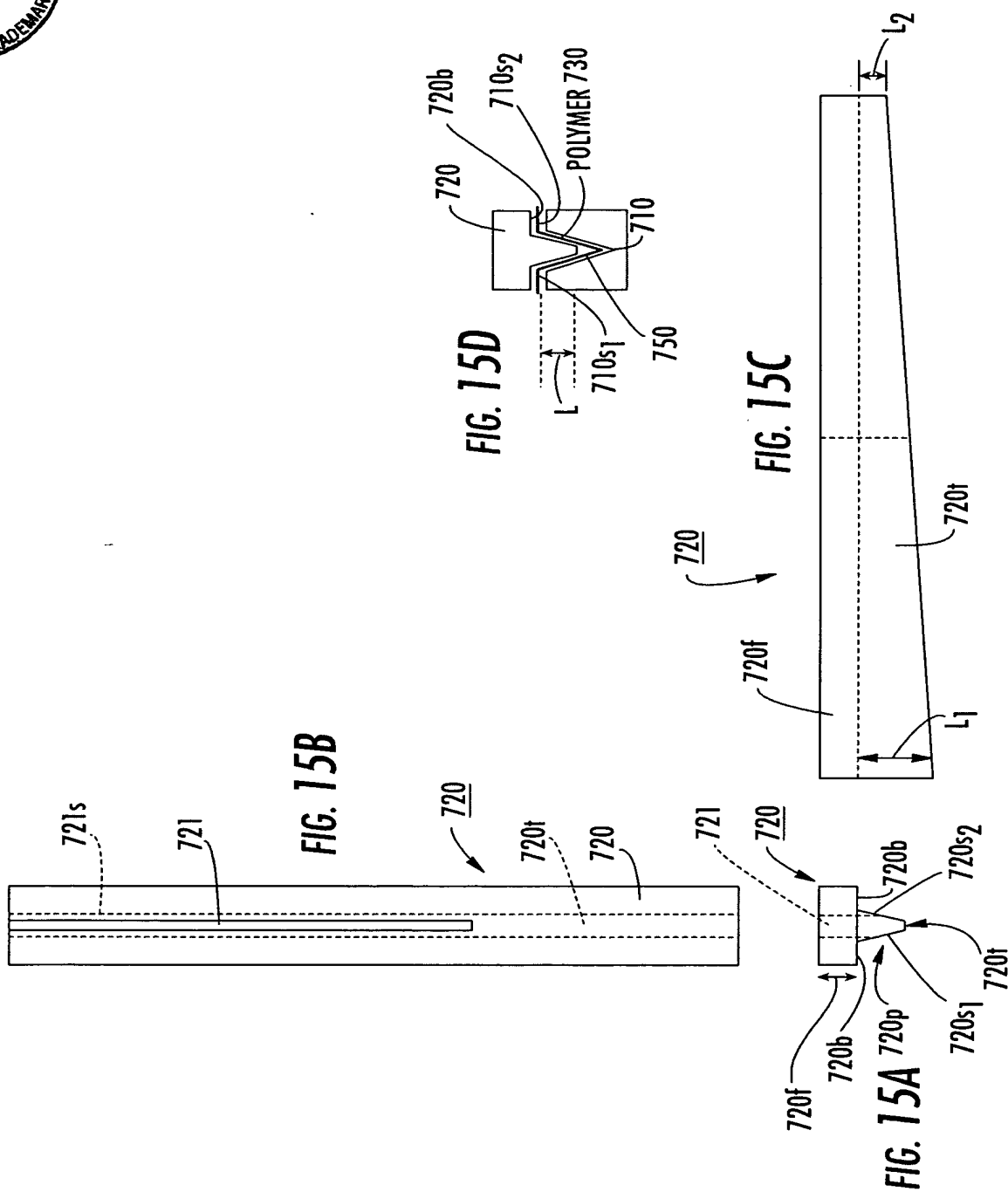


FIG. 14A





PART 3: PIEZOELECTRIC POLYMER

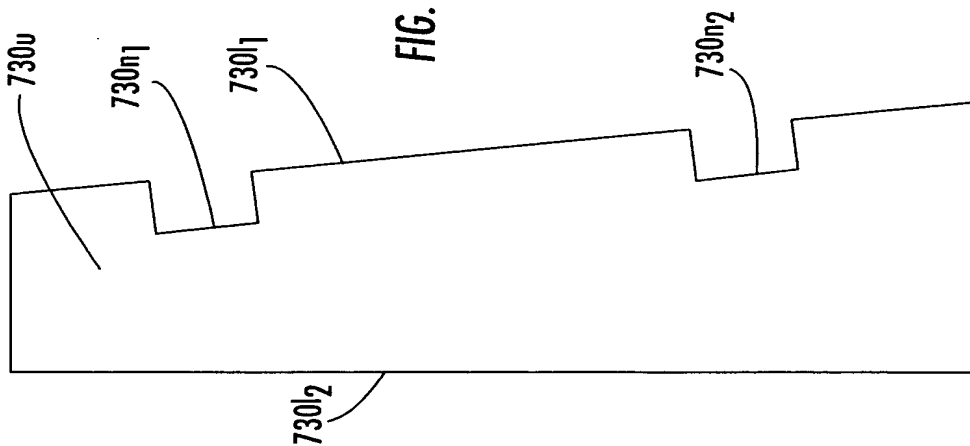


FIG. 16A

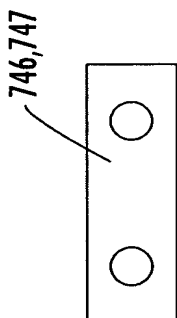


FIG. 16B

